

SCIENCE PROGRAM

District 200 high schools consider scientific thinking to be one of the cornerstones of a quality education. Understanding the scientific process, practicing experimentation, recording observations, and evaluating results are fundamental skills that provide a broad understanding of science and its impact on our society.

Recommended Sequence: District 200 high school graduation requirements specify the completion of three years or six semesters of science. The District 200 high school science program begins with the freshman level course Physics/Chemistry. This course is required of all students because it provides an appropriate foundation in the scientific method, modes of scientific inquiry, and mastery of fundamental scientific concepts. While most students follow a sequence that includes Physics/Chemistry, Biology, Chemistry, Physics, that sequence is not a District 200 requirement. The science program is intended to be one of choice. Therefore, other sequences of courses within the science department are available and can be designed with the specific interests and abilities of the student as the primary factor in determining that sequence.

PHYSICAL SCIENCES

The physical science courses include what is traditionally known as chemistry and physics. Chemistry courses emphasize the structure and behavior of matter from subatomic particles to macromolecules. Physics is the study of energy and energy's relationship with matter. Physics classes are structured around this theme. Topics include Newtonian mechanics, sound, light, electricity, and magnetism.

PHYSICS/CHEMISTRY (R, I)

Grade: 9 Two Semesters
Physics/Chemistry is a laboratory course that has a quantitative and qualitative approach to Physics and Chemistry. The Physics semester includes a study of the scientific way of knowing and the importance of empirical measurement in science. The following topics explore the interaction of matter and energy: motion, forces, energy, work, gravitational forces, projectile motion, and wave behavior in light and light properties. The Chemistry semester topics include properties of matter, atomic structure, nuclear chemistry, chemical bonding, the periodic table, types of reactions, and acids and bases.

PHYSICS/CHEMISTRY (A)

Grade: 9 Two Semesters
Prerequisite: Successful completion of Algebra I or concurrent registration in Geometry
Physics/Chemistry is a laboratory course that has a quantitative and qualitative approach to Physics and Chemistry. Algebra skills are necessary for success in this level of Physics/Chemistry. Students should be prepared for daily assignments that are both conceptual and mathematical, significant reading with note taking, projects, and report writing.

The Physics semester includes an introduction to scientific thinking and the importance of empirical measurement in science. Topics explore the interaction of matter and energy. Areas of study include motion, forces, energy, gravitational forces, and projectile motion. The Chemistry semester topics include properties of matter, atomic structure, nuclear chemistry, chemical bonding, the periodic table, types of reactions, and acids and bases.

CHEMISTRY (I)

Grades: 10, 11, 12 Two Semesters
Prerequisite: Algebra I and Physics/Chemistry (I)

Chemistry is a course designed for the college-bound student. It expands on the chemistry material covered in the Physics/Chemistry I course. Students get an understanding of chemistry and an awareness of the practical role of chemistry in society in an issue-oriented approach. Students should be prepared for group projects, discussions, and laboratory work.

CHEMISTRY (A)

Grades: 10, 11, 12 *Two Semesters*
Prerequisite: Algebra 1 and Physics/Chemistry (A), Concurrent enrollment in Algebra 2 & Trigonometry

Chemistry, A level, builds upon the Physics/Chemistry A level curriculum. It is a rigorous course that requires students to be self-directed, have motivationally strong study skills, and have strong reading comprehension skills. The course is designed to give students an opportunity to study many traditional chemical topics at an advanced level with regard to lab work, class discussion, and homework.

ADVANCED PLACEMENT CHEMISTRY (A)

Two Semesters
Prerequisite: Physics/Chemistry (A) and Chemistry (A)
Recommended: Concurrent enrollment in Pre-calculus

Qualifies for Applied Technology Credit

Advanced Placement Chemistry is designed to be the equivalent of the general chemistry course usually taken during the first college year. For some students, this course enables them to undertake, as freshmen, second-year work in the chemistry sequence at their institution or to register for courses in other fields where general chemistry is a prerequisite. For other students, the AP Chemistry course fulfills the laboratory science requirement.

Students are expected to attain an in-depth understanding of fundamentals and a reasonable competence in dealing with chemical problems. The course should contribute to the development of the students' abilities to think clearly and to express their ideas, orally and in writing, with clarity and logic. The college course in general chemistry differs qualitatively from the usual first secondary school course in chemistry with respect to the kind of textbook used, the topics covered, the emphasis on chemical calculations and the mathematical formulation of principles, and the kind of laboratory work done by students. Quantitative differences appear in the number of topics treated, the time spent on the course by students, and the nature and the variety of experiments done in the laboratory.

PHYSICS (I)

Grades: 10, 11, 12 *Two Semesters*
Prerequisite: Physics/Chemistry (I), Algebra 1
Recommended: Concurrent enrollment in Algebra 2 & Trigonometry

Physics, I level, is designed to expand on topics covered in Physics/Chemistry I. The curriculum is designed for college-bound students. It gives students an understanding of major concepts of physics in a laboratory setting. An understanding of algebra is required to solve problems presented in this course. Topics include: forces, energy, motion, waves, light, and electricity.

PHYSICS (A)

Grades: 10, 11, 12 *Two Semesters*
Prerequisite: Physics/Chemistry (A), Algebra 2 & Trigonometry
Recommended: Concurrent enrollment in Precalculus

Physics A level curriculum is designed to expand on topics covered in Physics/Chemistry A level. It provides a background in the physical laws that describe our universe. Areas of study include motion, forces, energy, light, electricity, magnetism and optics. This course relies heavily on laboratory experimentation and mathematical modeling.

ADVANCED PLACEMENT PHYSICS B (A)

Two Semesters
Qualifies for Applied Technology
Prerequisite: Physics/Chemistry (A), Physics (A), Calculus or concurrent registration in Calculus

Advanced Placement Physics B ordinarily forms the first part of the college sequence that serves as the foundation in physics for students majoring in the physical sciences or engineering. The sequence is parallel to or preceded by mathematics courses that include calculus. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. Strong emphasis is placed on solving a variety of challenging problems, some requiring calculus. This course the first part of a sequence which in college is sometimes a very intensive one-year course but often extends over one and one-half to two years, with a laboratory component.

BIOLOGICAL SCIENCES

The biological science courses emphasize the modern understanding of life on planet Earth. Curricular content includes the cellular basis of life, the structure and function of DNA, heredity, survey of living things, scientific theories of the origin and variation of life forms, and the role of populations and communities within ecosystems comprising the entire biosphere.

BIOLOGY (R, I)

Grades: 10, 11, 12 *Two Semesters*

Prerequisite: Physics/Chemistry I or R level or teacher recommendation

Biology includes an in-depth study of the scientific way of knowing and the definition of "life" from a scientific vantage point. Topics include the chemical nature of life, the cellular composition of all-living things, genetics, and biotechnology. The second semester surveys scientific theories on the diversification of life, classification of organisms, human systems, and the interaction of humans and other biota within the biosphere. Students should be prepared for daily assignments including significant reading, projects, and writing.

BIOLOGY (A)

Grades: 10, 11, 12 *Two Semesters*

Prerequisite: Successful completion of Physics/Chemistry A level or teacher recommendation

Biology A level is a laboratory-based course designed for students who wish to learn more about the biological sciences. Students should be prepared for a significant amount of reading outside the classroom setting as well as detailed laboratory write-ups.

First semester includes an in-depth study of the definition of "life" from a scientific vantage point. Topics include the interaction of humans and other biota within the biosphere, the chemical nature of life, the cellular composition of all-living things, genetics, and biotechnology. Second semester surveys scientific theories on the origin and diversification of life, classification of organisms, and human systems. Students should be prepared for accelerated, in-depth content learning in addition to extensive reading, individual and group projects, and writing.

ADVANCED PLACEMENT BIOLOGY (A)

Two Semesters

Prerequisite: Physics/Chemistry (A), Biology (A), Chemistry (A)

Qualifies for Applied Technology Credit

Advanced Placement Biology is intended for students who are considering a major in biology, biotechnology or the health fields. The course includes content from three general areas: molecules and cells, heredity and evolution, and organisms and populations. Advanced Placement Biology is designed to be the equivalent of a college introductory biology course taken by biology majors. If successfully completed, it offers students the possibility to take upper-level biology courses, or courses for which biology is a prerequisite, as a college freshman. Advanced Placement Biology provides students with the conceptual framework, factual knowledge, and analytical skills necessary to deal with the rapidly changing science of biology.

ENVIRONMENTAL BIOLOGY (I)

Grades: 11, 12 *Two Semesters*

Prerequisite: Physics/Chemistry (I or A), Biology (I or A)

Recommended: Chemistry or concurrent enrollment in Chemistry

Environmental Biology is designed for juniors and seniors interested in local and global environmental issues. The course combines traditional bookwork and assignments with weekly outdoor field projects. First semester students will adopt a study site and create a portfolio of the site's plants, animals, and water ecology. Proper field biology techniques and use of equipment and materials will be emphasized. Second semester will explore global issues like world population, pollution, and man's relation to his environment. Field experiences will include winter tracking, learning animal behavior and watching the spring bird migration. Students' success in this class will require a great deal of active participation, independent work, and responsibility.

EARTH AND SPACE SCIENCES

The earth science courses have as their focus the planet on which we live, along with its relationship to the solar system and the rest of the universe. The physical forces that have shaped the planet over time and on-going phenomenon, such as erosion, tidal forces, and weather, are also key topics. Space science courses have as their purview our solar system in relation to the Milky Way Galaxy and the enormity of the universe.

ASTRONOMY (I)

Grades: 10, 11, 12

One Semester

Prerequisite: Physics/Chemistry and Algebra 1

Astronomy is designed to explain and enhance understanding of the physical properties of the universe, with particular emphasis on our solar system, our galaxy, and our ability to use observational techniques and equipment to explore planets, stars, and other celestial objects and phenomenon. Topics include the historical development of astronomy, the structure, position, and motion of objects within the universe, the life-cycle of celestial objects, and the question of life within the universe.

EARTH SCIENCE (R)

Grades: 10, 11, 12

Two Semesters

Earth Science is the study of the relationship of Earth within the solar system and universe as well as the physical nature of earth itself. Students explore topics including the origins of the planet, the geological methods for determining the age of geologic objects, the methods by which mountains, plains, valleys, and bodies of water are created and changed, and the interaction of organisms and the physical planet. Emphasis is placed on learning strategies, organizational skills, note taking, and laboratory skills.

GEOLOGY (I)

Grades: 10, 11, 12

One Semester

Prerequisite: Physics/Chemistry and one year of high school math

Geology introduces students to the fundamentals of the Earth's composition and physical character. Topics include landforms and their evolution, plate tectonics, the fossil record, and the physical properties and composition of rocks and minerals. Atmospheric dynamics such as wind, rain, heat, and climate are also covered extensively, including laboratory experiences designed to measure heat, motion, force, and porosity.